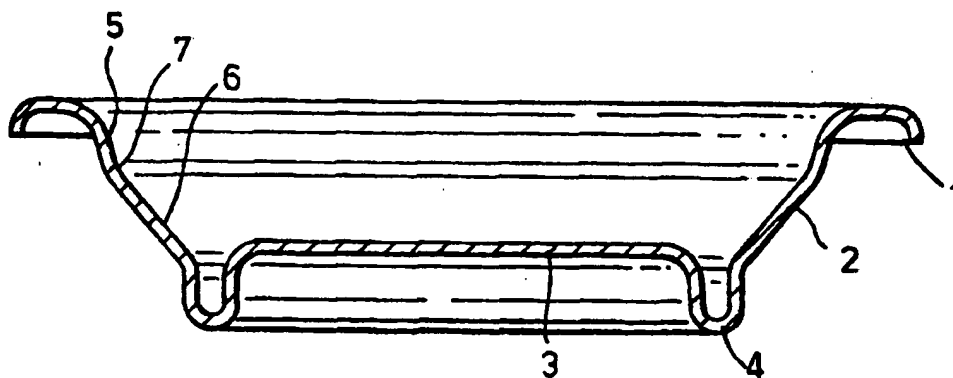




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(54) Title: CAN ENDS



(57) Abstract

An unseamed can end comprises a cover hook, (1) a chuck wall (2), a reinforcing bead (4) and a central panel (3). The chuck wall is in two parts; an upper part (5) adjacent the cover hook, and a lower part (6) adjacent the reinforcing bead. The upper part is at an angle of approximately 14° to the horizontal, and the lower part is at an angle of approximately 42° to the horizontal. This produces a step (7) between the two parts of the chuck wall. This arrangement maintains the advantages of a shallower than conventional chuck wall, whilst reducing the reforming of the chuck wall during seaming.

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"CAN ENDS"

The present invention relates to can ends, and to the attachment of can ends to a can body by means of a double seam.

Our earlier published patent application WO96/37414 describes a can end having a chuck wall which is at a much shallower angle than has heretofore been conventional. The present invention provides a modification to the can end described therein.

Accordingly there is provided an unseamed can end comprising a peripheral cover hook, a chuck wall dependent from the interior of the cover hook, an outwardly concave annular reinforcing bead extending radially inwards from the chuck wall, and a central panel supported by an inner portion of the reinforcing bead, characterised in that the chuck wall is in two parts, a first part adjacent the cover hook and a second part adjacent the reinforcing bead, the second part being inclined to an axis perpendicular to the exterior of the central panel to a greater extent than the first part, the first part being inclined to the said axis at an angle of between 1° and 39° , and the second part being inclined to the said axis at an angle between 30° and 60° .

The advantage of this two part design is that it reduces the amount of reforming of the chuck wall which takes place during the seamer operation. This may make it easier to obtain satisfactory and consistent seamer settings.

Preferably the angle of the second part of the chuck wall to the said axis is between 40° and 45° , and the angle of the first part of the chuck wall to the said axis is between 4° and 20° , typically between 7° and 14° .

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Conveniently the concave cross sectional radius of the reinforcing bead is less than 0.75mm, and the outer wall of the reinforcing bead is inclined to the said axis at an angle between -15° and 15° and the height of the
5 outer wall is up to 2.5mm.

The can end is conveniently made of a laminate of thermoplastic polymer film and a sheet aluminium alloy or tinplate or electrochrome coating of steel. Preferably the laminate comprises a polyethelene teraphalate (PET)
10 film on an aluminium/manganese alloy sheet less than 0.01" (0.25mm) thick. The length of the first part of the chuck wall is conveniently between 0.05" and 0.15", and preferably is approximately 0.1".

The invention further resides in a method of forming
15 a can end comprising the steps of:-

1) forming an end shell comprising a peripheral cover hook portion, a chuck wall dependant from the interior of the cover hook portion, an outwardly concave annular reinforcing bead extending radially inwards from
20 the chuck wall, and a central panel supported by an inner portion of the reinforcing bead, the chuck wall being inclined to an axis perpendicular to the exterior of the central panel at an angle of bewtween 30° and 60° ; and

ii) deforming a part of the chuck wall adjacent the
25 cover hook portion so that it is inclined to the said axis at an angle of between 1° and 39° , but less than the angle of the remainder of the chuck wall. The method preferably includes the additional step of subsequently curling over the periphery of the cover hook portion to
30 form a curled cover hook.

The invention further resides in a method of forming a double seam between a can body and a can end as

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previously described, said method comprising the steps of:-

placing the curl of the can end on a flange of a can body supported on a base plate;

5 locating a chuck within the chuck wall of the can end, said chuck wall being in two parts, a first part adjacent the curl of the can end being inclined to the longitudinal axis of the can at an angle of between 1° and 39°, and a second part inclined to the said axis at
10 an angle of between 30° and 60°, the inclination of the second part being greater than that of the first part, said chuck having a frustoconical drive surface of substantially equal slope to that of the second part of the chuck wall of the can end and a substantially
15 cylindrical surface portion extending away from the drive surface;

causing relative motion as between the assembly of can end and can body and a first operation seaming tool to form a first operation seam;

20 and thereafter causing relative motion as between the first operation seam and a second operation tool to complete a double seam, whereby during these seaming operations the first part of the chuck wall of the can end becomes deformed to contact the cylindrical portion
25 of the chuck.

The invention will now be further described by way of example only, with reference to the accompanying drawings, in which:-

Fig.1 is a sectioned side view of the can end
30 according to the invention before edge curling;

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Fig.2 is a sectional side view of the can end according to the present invention, shown in an end press at a first stage of the manufacturing process;

Fig.3 is a sectional side view of the can end according to the present invention, shown in an end press at a 2nd stage of the manufacturing process;

Fig.4 is a sectional side view of the can end according to the present invention, shown in an end press at a final stage of the manufacturing process;

Fig.5 is a sectioned side view of the can end and a can body at the start of the seaming operation; and

Fig.6 is a sectioned side view of the can end and can body of Fig.5 during the seaming operation.

Referring to Fig.1, a can end in accordance with the invention comprises a peripheral cover hook 1, a chuck wall shown generally at 2 extending axially and inwardly from the interior of the cover hook, and a central panel 3. Between the chuck wall 2 and the central panel 3 is an outwardly concave reinforcing bead 4 (known as an anti-peaking bead or countersink). The dimensions and other details of the reinforcing bead 4 are as described in our application WO96/37414.

The chuck wall 2 is in two parts 5 and 6. The first upper part 5 adjacent to the cover hook 1 is at an angle of approximately 14° to the vertical (i.e. the axis perpendicular to the central panel 3). The first part 5 is approximately 0.1" long. The second lower part 6 adjacent the reinforcing bead 4 is at an angle of approximately 42° to the vertical. The first and second parts of the chuck wall 2 meet at an annular elbow 7.

The can end is formed in a conventional end shell press, as will now be described with reference to Figures

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2 to 4. Referring to Fig.2, the press comprises an annular pressure ring 20 and a draw punch 21 arranged coaxially and slideably within the pressure ring.

Opposite the pressure ring is an annular draw ring 22

5 having an angled draw surface 23. Coaxially and slideably arranged within the draw ring is a reform pad 24, with an annular recess 25 therebetween. In use a metal blank is held between the draw punch 21 and the reform pad 24, and also between the pressure ring 20 and
10 draw ring 22. As the draw punch 21 and reform pad 24 are moved downwardly with respect to the pressure ring 20 and draw ring 22, the material is drawn over the draw surface 23 of the draw ring in order to form an end shell with an angled chuck wall 2. Subsequently the draw punch and
15 reform pad are raised with respect to the pressure ring and draw ring so that material at the bottom of the chuck wall is deformed in an unconstrained rolling action into the annular recess 25 so as to form the anti-peaking bead 4.

20 The end shell is then transferred by means of a belt (not shown) to a second forming station, shown in Fig.3. As before the shell is held between a pressure ring 20', a draw punch 21', a draw ring 22' and a reform pad 24'. The draw surface of the draw ring and the outer sidewall
25 26 of the draw punch have complementary shaped surfaces so as to reform the chuck wall 2 into the two part geometry described with reference to Fig.1. At the same time, a first curling punch 27 slideably located over the pressure ring is moved so as to contact the outer
30 periphery of the end shell so as to form an initial curl, shown generally at 28.

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The end shell is then transferred, again by belt, to a final curling station shown in Fig.4. The draw punch 21", draw ring 22" and reform pad 24" are substantially as before, whilst the pressure ring is now formed of two concentric rings 29 and 30 respectively. The outer ring 30 is moved upwardly to allow the further curling of the periphery of the end shell, by means of an upwardly moving second curling punch 31. This forms the shape of the final curl, shown generally at 32.

Fig.5 shows a completed can end 8 positioned on a can body 9 and held in place by a chuck 10. The chuck has a frustoconical drive surface 11 at an angle of 42° and adapted to drive the can end via contact with the lower part 6 of the chuck wall 2. The can end 8 is seamed onto the can body with conventional first and second operation double seaming rolls, one of which is shown at 12 in Fig.3. During the seaming operation the upper part 5 of the chuck wall of the can end is reformed to be substantially vertical, being constrained between the seaming roll 12 and the cylindrical sidewall 13 of the chuck 10. Fig.6 shows the second seaming operation in progress, with the left hand side of the figure showing the seam following the first operation and prior to the second operation, whilst the right hand side of the figure shows a portion of the seam which has been contacted by the seaming roll 12 to complete the double seam.

CLAIMS:

1. An unseamed can end comprising a peripheral cover hook, a chuck wall dependent from the interior of the cover hook, an outwardly concave annular reinforcing bead extending radially inwards from the chuck wall, and a central panel supported by an inner portion of the reinforcing bead, characterised in that the chuck wall is in two parts, a first part adjacent the cover hook and a second part adjacent the reinforcing bead, the second part being inclined to an axis perpendicular to the exterior of the central panel to a greater extent than the first part, the first part being inclined to the said axis at an angle of between 1° and 39° , and the second part being inclined to the said axis at an angle of between 30° and 60° .
2. A can end according to claim 1, wherein the angle of the second part of the chuck wall to the said axis is between 40° and 45° .
3. A can end according to claim 1 or claim 2, wherein the angle of the first part of the chuck wall to the said axis is between 4° and 20° .
4. A can end according to claim 3, wherein the angle of the first part of the chuck wall to the said axis is between 7° and 14° .

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5. A can end according to any of claims 1 to 4, wherein the concave cross sectional radius of the reinforcing bead is less than 0.75mm.
6. A can end according to claim 5, wherein an outer wall of the reinforcing bead is inclined to the said axis at an angle between -15° and $+15^{\circ}$ and the height of the outer wall is up to 2.5mm.
7. A can end according to any preceding claim when made of a laminate of thermoplastic polymer film and a sheet aluminium alloy or tinplate or electrochrome coated steel.
8. A can end according to any preceding claim, wherein the length of the first part of the chuck wall is between 0.05 inches and 0.15 inches.
9. A can end according to claim 8, wherein the length of the first part of the chuck wall is approximately 0.1 inch.
10. A method of forming a can end comprising the steps of
 - i) forming an end shell comprising a peripheral cover hook portion, a chuck wall dependant from the interior of the cover hook portion, an outwardly concave annular reinforcing bead extending radially inwards from the chuck wall, and a central panel supported by an inner portion of the reinforcing bead, the chuck wall being inclined to an axis perpendicular to the exterior of the central panel at an angle of between 30° and 60° ; and

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ii) deforming a part of the chuck wall adjacent the cover hook portion so that it is inclined to the said axis at an angle of between 1° and 39° , but less than the angle of the remainder of the chuck wall.

11. A method according to claim 10, including the additional step of subsequently curling over the periphery of the cover hook portion to form a curled cover hook.

12. A method of forming a double seam between a can body and a can end according to any of claims 1 to 8, said method comprising the steps of:-

placing the curl of the can end on a flange of a can body supported on a base plate;

locating a chuck within the chuck wall of the can end, said chuck wall being in two parts, a first part adjacent the curl of the can end being inclined to the longitudinal axis of the can at an angle of between 1° and 39° , and a second part inclined to the said axis at an angle of between 30° and 60° , the inclination of the second part being greater than that of the first part, said chuck having a frustoconical drive surface of substantially equal slope to that of the second part of the chuck wall of the can end and a substantially cylindrical surface portion extending away from the drive surface;

causing relative motion as between the assembly of can end and can body and a first operation seaming tool to form a first operation seam;

and thereafter causing relative motion as between the first operation seam and a second operation tool to

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complete a double seam, whereby during these seaming operations the first part of the chuck wall of the can end becomes deformed to contact the cylindrical portion of the chuck.

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Fig.3.

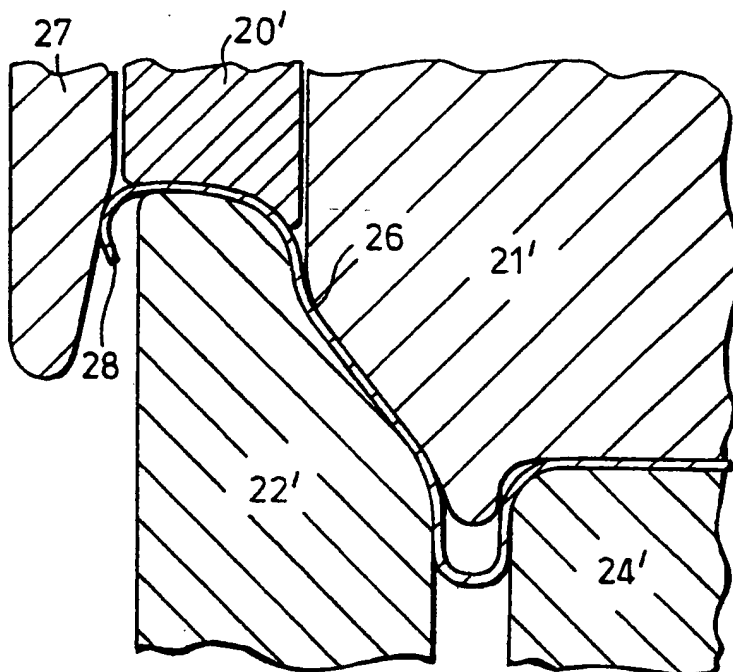
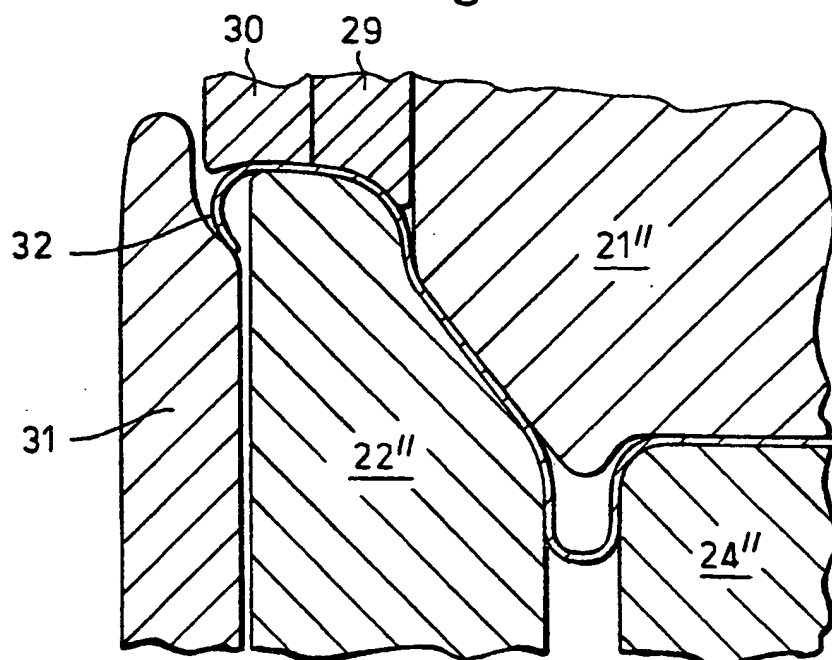


Fig.4.



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Fig.5.

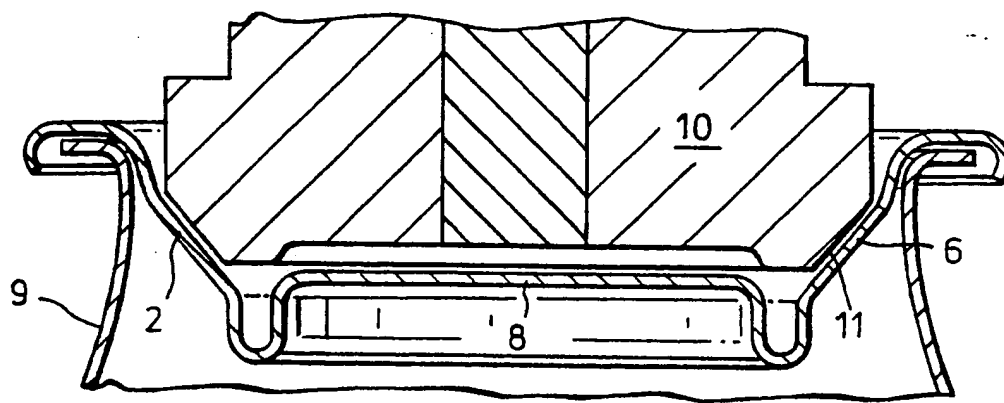
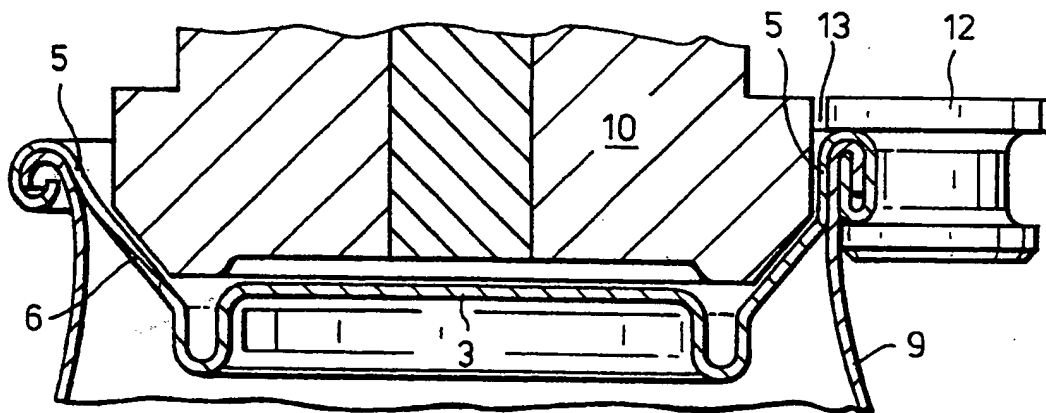


Fig.6.



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/00243

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B21D51/38 B21D51/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B21D B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96 37414 A (METAL BOX. PLC ;CARNAUDMETALBOX SA (FR); CARNAUDMETALBOX NV (NL); C) 28 November 1996 cited in the application see the whole document -----	1,10
A	EP 0 340 955 A (METAL BOX PLC) 8 November 1989 -----	
A	US 4 716 755 A (BULSO JR JOSEPH D ET AL) 5 January 1988 -----	
A	US 3 843 014 A (COSPEN J ET AL) 22 October 1974 -----	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

26 March 1998

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 98/00243

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